How to lower the district heating return temperature from historical apartment buildings

Østergaard, Dorte Skaarup; Sørensen, Ida Bach; Svendsen, Svend

Publication date:
2017

Document Version
Peer reviewed version

Dorte Skaarup Østergaard, Ph.D. student in the 4DH network. Performing dynamic simulation and evaluation of existing buildings. Analysing how to provide space heating for existing buildings with low-temperature district heating.

How to lower the district heating return temperature from historical apartment buildings

Dorte Skaarup Østergaard[1], Ida Bach Sørensen[2], Svend Svendsen[31] Corresponding author and presenter, Ph.D. student, Technical University of Denmark, Department of Civil Engineering, Brovej, Building 118, DK-2800 Kgs. Lyngby, Denmark. Tel. +45 42 25 18 80, E-mail address: dskla@byg.dtu.dk.[2] Civil Engineer, Damgaard Consulting Engineers, Algade 43,3. DK-4000 Roskilde, Denmark.[3] Professor, Technical University of Denmark, Department of Civil Engineering, Brovej, Building 118, DK-2800 Kgs. Lyngby, Denmark.*

Keywords: Low-temperature district heating, hydraulic radiators, thermostatic radiator valves, heating system control,

Lowering the return temperature in the district heating networks can be seen as a first step towards low-temperature district heating. Lower return temperatures will help ensure that existing district heating networks have the hydraulic capacity to allow a reduction of the supply temperature in the future. Additionally, lower return temperatures provide direct economic benefits through reduced heat losses in the network and more efficient heat production, without requiring significant investments in improved heating installations inside the buildings. In this study we investigated the possibility of lowering the district heating return temperature from a typical apartment building in the Copenhagen area. Firstly, the district heating substation and domestic hot water tanks in the building were examined, to correct errors in the central control system. Secondly the heating system was examined and improved, and all hydraulic radiators in the apartments were equipped with new electronic thermostats to improve heating system control. The study found that the district heating return temperature from the building in the winter time was lowered by 10 °C – from approximately 55 °C to 45 °C. Such temperature reduction can result in an economic benefit for the occupants of more than 700 Euro per year, as many Danish district heating companies provide an economic incentive for customers to lower the district heating return temperature.